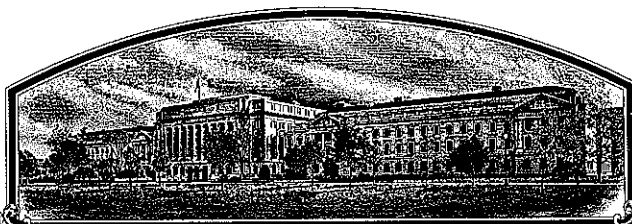


No.

9000119



# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

**Busch Agricultural Resources, Inc.**

Whereas, THERE HAS BEEN PRESENTED TO THE

**Secretary of Agriculture**

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS OF THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

BARLEY

'Duel'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this 30th day of November in the year of our Lord one thousand nine hundred and ninety-three.

Attest:

*Kenneth H. Evans*  
Commissioner  
Plant Variety Protection Office  
Agricultural Marketing Service

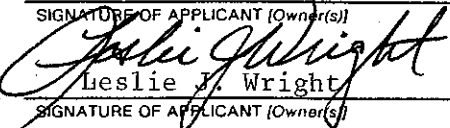
*Mike Egan*  
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE

# APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.	3. VARIETY NAME
BUSCH AGRICULTURAL RESOURCES INC.		BT917	DUEL
4. ADDRESS (street and no. or R.F.D. no., city, state, and ZIP)		5. PHONE (include area code)	<b>FOR OFFICIAL USE ONLY</b> PVPO NUMBER <div style="font-size: 2em;">9000119</div>
3515 East County Road 52 P.O.Box 8306 Fort Collins, CO 80524		(303) 221-5622	
6. GENUS AND SPECIES NAME	7. FAMILY NAME (Botanical)		
Hordeum vulgare L.	Gramineae		
8. CROP KIND NAME (Common Name)	9. DATE OF DETERMINATION	<b>FOR OFFICIAL USE ONLY</b> Filing and Examination Fee: <div style="font-size: 1.2em;">\$ 2150.00</div> Date <div style="font-size: 1.2em;">Mar. 13, 1990</div> Certificate Fee: <div style="font-size: 1.2em;">\$ 250.00</div> Date <div style="font-size: 1.2em;">Nov. 15, 1993</div>	
Spring Barley	April 1, 1981		
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.)			
Corporation			
11. IF INCORPORATED, GIVE STATE OF INCORPORATION	12. DATE OF INCORPORATION		
Delaware	January 1, 1981		
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS			
Dr. Les J. Wright /Duane D. Teehee Busch Agricultural Resources Inc PO Box 8306 Ft. Collins, CO 80524			
		PHONE (include area code): (303) 221-5622	
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow INSTRUCTIONS on reverse)			
a. <input checked="" type="checkbox"/> Exhibit A, Origin and Breeding History of the Variety. b. <input checked="" type="checkbox"/> Exhibit B, Novelty Statement. c. <input checked="" type="checkbox"/> Exhibit C, Objective Description of Variety. d. <input checked="" type="checkbox"/> Exhibit D, Additional Description of Variety. e. <input checked="" type="checkbox"/> Exhibit E, Statement of the Basis of Applicant's Ownership. f. <input type="checkbox"/> Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office _____ g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,150) made payable to "Treasurer of the United States."			
15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See section 83(a) of the Plant Variety Protection Act.)			
<input checked="" type="checkbox"/> YES (If "YES," answer items 16 and 17 below) <input type="checkbox"/> NO (If "NO," skip to item 18 below)			
16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?		17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		<input checked="" type="checkbox"/> FOUNDATION <input checked="" type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED	
18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?			
<input type="checkbox"/> YES (If "YES," through <input type="checkbox"/> Plant Variety Protection Act <input type="checkbox"/> Patent Act. Give date: _____.) <input checked="" type="checkbox"/> NO			
19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRIES?			
<input type="checkbox"/> YES (If "YES," give names of countries and dates) <input checked="" type="checkbox"/> NO			
20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.			
The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act. Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.			
SIGNATURE OF APPLICANT (Owner(s))		CAPACITY OR TITLE	DATE
		Director, Seed Research Busch Agricultural Resources	March 3, 1990
SIGNATURE OF APPLICANT (Owner(s))		CAPACITY OR TITLE	DATE

**EXHIBIT A**

Origin and Breeding History of Duel (BT 917, 6B81-7152)

Pedigree: Morex//6B75-1374/M-31

Date of Cross: The cross was completed in the fall 1978 greenhouse; the F1 was grown in the early spring of 1979 indoors to produce F2 seed.

History: F2 plants were grown outdoors at Bentley, Alberta later that year. A single seed from an F2 head selection was multiplied indoors and a F4 head-row selected in 1980 at Bentley. Malting quality prediction tests on remnant F4 seed assisted in the selection of an F5 seed increase plot in Yuma, Arizona for yield testing as an F2 derived F6 bulk at Bentley and Watrous, Alberta in 1981. And throughout the prairie provinces in 1982 as 6B81-7152 in second year yield trials. 6B81-7152 was advanced to third year yield trials in 1983 and continued as an advanced entry until 1989. It has also been tested in the Canadian Western Co-operative Six-Row Barley Tests from 1984 - 1986 as BT917. The proposed name for 6B81-7152(BT 917) is "Duel" which is pending as a trademark in Canada.

Purification was initiated in 1983 when 100 head-rows were grown and only selected heads chosen and bulked for increase in New Zealand during the winter of 1983-84. Breeder seed increases were initiated in 1985 at Berthoud, Colorado. Breeder seed will be re-constituted from head-rows as necessary.

9000119

## Amendment 1 to Exhibit A

**CLASS:** SPRING BARLEY

**NAME:** DUEL

**NOMENCLATURE:** Hordeum vulgare

**PI NO:**

**RELEASED:** March, 1990

**SELECTION NO:** 6B81-7152

**PEDIGREE:** MOREX//6B75-1374/M-31

The second cross was completed in the Fall 1978 greenhouse; the F1 seed was grown in the Spring 1979 greenhouse. F2 seed was planted at Bentley, Alberta, late Spring 1979. Single F3 seeds taken from selected F2 heads were planted in the Fall 1979 greenhouse. F4 seed grown as headrows were planted at Bentley in 1980. Selected headrows were bulk harvested and the F5 seed was planted in Yuma, Arizona, Fall 1980. Malting quality tests on remnant F4 seed was used in selecting the F5 plot which was bulk harvested and planted in first year yield trials in Canada as an F2 derived F6 bulk.

'Duel' was assigned the experimental number **6B81-7152** in the 1981 first year yield trials grown in Bentley and Watrous, Alberta. It was advanced to second year yield trial 1982 and third year yield trials 1983. It remained as an entry in the Busch Ag advanced yield trials until 1989 being grown throughout the prairie provinces of Alberta, Saskatchewan, and Manitoba. From 1984 - 1986 'Duel' was entered in the Canadian Western Cooperative Six-Row Barley Tests as **BT917**.

'Duel' was bred for yield, malting quality, blue aleurone, smooth awns and it's ability to thrive in the Canadian provinces. It has a 9 - 12% higher yield than 'Bonanza' and malt quality equal to 'Bonanza'.

Irrelevant  
parts of  
letter of 8 Jul 1993  
omitted  
AAA  
24 Sept 1993

The reason for the delay in the answer is that 'Duel' harvested in Canada in 1992 did not exhibit a dark blue aleurone. Producers who purchased the 'Duel' seed Spring 1993 questioned the purity of the product. We believe the lighter colored seeds are in fact 'Duel' and that 'Duel' exhibits a range of blue aleurone color from dark blue to light blue ("white") depending on environmental conditions. Our marketer in Canada, the Alberta Wheat Pool, has sent samples to the Canadian Plant Health and Plant Products Directorate for examination and we are growing "white" 'Duel' seed in our greenhouse to verify that it produces blue aleurone seed.

If you have further questions please contact me at (303) 221-5622.

Sincerely,



Duane D. Teehee  
Purity & Multiplication Mgr.

cc Gene T. Tewksbury

Bush Agricultural Resources, Inc.  
Seed Research  
20111 County Rd 102  
P.O. Box 1000  
Hickory, CO 80630  
Phone: 303-221-5622  
Fax: 303-221-5622



Busch Agricultural  
Resources, Inc.

ONE OF THE ANHEUSER-BUSCH COMPANIES

9000119

22 September, 1993

Dr. Alan Atchley  
Plant Variety Protection Office  
10301 Baltimore Blvd  
Beltsville, MD 20705-2351

RE: Spring Barley Application No. 9000119, 'Duel'

Dear Dr. Atchley,

The enclosed is the Amendment to Exhibit A requested in Mr. Tewksbury's ltr dated 14 December, 1992 stating the stability and uniformity of 'Duel' over 'X' number of generations. I have also resubmitted the statement of the traits of 'Duel'.

Thank you for your patience in this matter. The samples sent to the Canadian Plant and Health Directorate passed the examination for purity. Our "white" samples grown in the greenhouse did produce blue aleurone seed.

Sincerely,

Duane D. Teehee

cc G.T. Tewksbury

Busch Agricultural Resources, Inc.  
Seed Research  
3515 E. County Rd. 52  
P.O. Box 8306  
Ft. Collins, CO 80524  
(303) 221-5622  
FAX: (303) 482-5965

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## Amendment 2 to Exhibit A

'Duel' is stable and will remain stable over the five generations of Breeder Seed, Foundation, Registered, and the two years as Certified Seed.

'Duel' is uniform for the plant characteristics stated in this application over the five generations of Breeder Seed, Foundation, Registered, and the two years as Certified Seed, except for Aleurone color (exhibit C, 10. Seed). Under certain growing conditions 'Duel's' aleurone color may range from white to dark blue.

## EXHIBIT B

9000119

### NOVELTY STATEMENT

Duel is most similar to the spring barley variety "Bonanza", however, it can be distinguished by the following morphological characteristics:

- Duel has long glume hairs restricted to the midline. Bonanza has numerous long glume hairs in a broad band.
- Duel has a lemma base shape of a tranverse crease. Bonanza's lemma base shape is registered as a depression tending toward a crease.
- Duel heads and matures about two days later than Bonanza. (See exhibit F page 1)



U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
LIVESTOCK AND SEED DIVISION  
BELTSVILLE, MARYLAND 20705

EXHIBIT C  
(Barley)

OBJECTIVE DESCRIPTION OF VARIETY  
BARLEY (*HORDEUM VULGARE*)

INSTRUCTIONS: See Reverse.

NAME OF APPLICANT(S)

BUSCH AGRICULTURAL RESOURCES INC.

ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)

3515 East County Rd 52  
Fort Collins, CO 80524

FOR OFFICIAL USE ONLY

PVPO NUMBER

9000119

VARIETY NAME OR TEMPORARY  
DESIGNATION

Place the appropriate number that describes the varietal character of this variety in the boxes below.  
Place a zero in first box (i.e.  or ) when number is either 99 or less or 9 or less.

1. GROWTH HABIT:

1 - SPRING 2 - FACULTATIVE WINTER 3 - WINTER  Early Growth: 1 - PROSTRATE 2 - SEMIPROSTRATE  
3 - ERECT

2. MATURITY (50% Flowering):

1 - EARLY (California Mariout) 2 - MIDSEASON (Betzes) 3 - LATE (Frontier)

No. of days Earlier than .....  } 1 - BETZES 2 - CALIFORNIA MARIOUT 3 - CONQUEST 4 - DICKSON  
 No. of days Later than .....  } 5 - PIROLINE 6 - PRIMUS 7 - UNITAN 8 = Bonanza

3. PLANT HEIGHT (From soil level to top of head):

1 - SEMIDWARF 2 - SHORT (California Mariout) 3 - MEDIUM TALL (Betzes) 4 - TALL (Conquest)

Cm. Shorter than .....  } 1 - BETZES 2 - CALIFORNIA MARIOUT 3 - CONQUEST 4 - DICKSON  
 Cm. Taller than .....  } 5 - PIROLINE 6 - PRIMUS 7 - UNITAN 8 = Bonanza

4. STEM:

Exertion (Flag to spike at maturity): 1 - 0 - 3 cm. 2 - 3 - 10 cm.  Anthocyanin: 1 - ABSENT 2 - PRESENT  
3 - 10 - 15 cm.

NO. OF NODES (Originating from node above ground)

Collar Shape: 1 - CLOSED 2 - V-SHAPED 3 - OPEN  Shape of Neck: 1 - STRAIGHT 2 - SNAKY  
4 - MODIFIED CLOSED OR OPEN 3 - OTHER (Specify) .

5. LEAF:

Basal leaf sheath (seedling): 1 - GLABROUS 2 - PUBESCENT  Position of flag leaf (at boot stage): 1 - DROOPING  
2 - UPRIGHT  
3 = 90 deg angle  
 Waxiness: 1 - ABSENT (Glossy) 2 - SLIGHTLY WAXY  MM. WIDTH (First leaf below flag leaf)  
3 - WAXY  
 CM. LENGTH (First leaf below flag leaf)  Anthocyanin in leaf sheath: 1 - ABSENT 2 - PRESENT

6. HEAD:

Type: 1 - TWO-ROWED 2 - SIX-ROWED  Density: 1 - LAX 2 - ERECT (Not dense)  
3 - ERECT (Dense)  
 Shape: 1 - TAPERING 2 - STRAP 3 - CLAVATE  Waxiness: 1 - ABSENT (Glossy) 2 - SLIGHTLY WAXY  
4 - OTHER (Specify) 3 - WAXY  
 Lateral Kernels Overlap: 1 - NONE 2 - AT TIP  Rachis (Hair on edge): 1 - LACKING 2 - FEW 3 - COVERED  
3 - 1/4 - 1/2 OF HEAD

7. GLUME:

Length: 1 - 1/3 OF LEMMA 2 - 1/2 OF LEMMA  Hairs: 1 - NONE 2 - SHORT 3 - LONG  
3 - MORE THAN 1/2 OF LEMMA  
 Hair covering: 1 - NONE 2 - RESTRICTED TO MIDDLE 3 - CONFINED TO BAND 4 - COMPLETELY COVERED  
 Awns: 1 - LESS THAN EQUAL TO LENGTH OF GLUMES 2 - EQUAL TO LENGTH OF GLUMES  
3 - MORE THAN EQUAL TO LENGTH OF GLUMES  
 Awn Surface: 1 - SMOOTH 2 - SEMISMOOTH 3 - ROUGH

## 8. LEMMA:

☐ Awn: 1 = AWNLESS 2 = AWNLETS ON CENTRAL ROWS, AWNLESS ON LATERAL ROWS  
 3 = SHORT ON CENTRAL ROWS, AWNLETS ON LATERAL ROWS 4 = SHORT (less than equal to length of spike)  
 5 = LONG (longer than spike) 6 = HOODED

☐ Awn Surface: 1 = AWNLESS 2 = SMOOTH 3 = SEMISMOOTH 4 = ROUGH

☐ Teeth: 1 = ABSENT 2 = FEW 3 = NUMEROUS ☐ Hair: 1 = ABSENT 2 = PRESENT

☐ Shape of base: 1 = DEPRESSION 2 = SLIGHT CREASE 3 = TRANSVERSE CREASE ☐ Rachilla Hairs: 1 = SHORT 2 = LONG

## 9. STIGMA:

☐ Hairs: 1 = FEW 2 = MANY

## 10. SEED:

☐ Type: 1 = NAKED 2 = COVERED ☐ Hairs on Ventral Furrow: 1 = ABSENT 2 = PRESENT

☐ Length: 1 = SHORT (8.0 mm.) 2 = SHORT TO MIDLONG (7.5 - 9.0 mm.) 3 = MIDLONG (8.5 - 9.5 mm.)  
 4 = MIDLONG TO LONG (9.0 - 10.5 mm.) 5 = LONG (10.0 mm.)

☐ Wrinkling of hull: 1 = NAKED 2 = SLIGHTLY WRINKLED 3 = SEMIWRINKLED 4 = WRINKLED

☐ Aleurone Color: 1 = COLORLESS (White or Yellow) 2 = BLUE

☐ PERCENT ABORTIVE

☐ GMS. PER 1000 SEEDS

## 11. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant) 3 = Moderately Susceptible, 4 = Moderately Resistant

<input type="checkbox"/> SEPTORIA	<input type="checkbox"/> NET BLOTCH	<input type="checkbox"/> SPOT BLOTCH	<input type="checkbox"/> POWDERY MILDEW
<input type="checkbox"/> LOOSE SMUT	<input type="checkbox"/> BACTERIAL BLIGHT	<input type="checkbox"/> COVERED SMUT	<input type="checkbox"/> FALSE LOOSE SMUT
<input type="checkbox"/> STEM RUST	<input type="checkbox"/> LEAF RUST	<input type="checkbox"/> SCAB	<input type="checkbox"/> SCALD
<input type="checkbox"/> AY	<input type="checkbox"/> BSMV	<input type="checkbox"/> BYDV	<input type="checkbox"/> OTHER (Specify) Common Root Rot

## 12. INSECT: (0 = Not tested, 1 = Susceptible, 2 = Resistant)

<input type="checkbox"/> GREEN BUG	<input type="checkbox"/> ENGLISH GRAIN APHID	<input type="checkbox"/> CHINCH BUG	<input type="checkbox"/> ARMYWORM
<input type="checkbox"/> GRASS HOPPERS	<input type="checkbox"/> CERIAL LEAF BETTLE	<input type="checkbox"/> OTHER (Specify)	
HESSIAN FLY RACES: <input type="checkbox"/> GP <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/> F <input type="checkbox"/> G			

## 13. CHEMICAL (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

☐ DDT ☐ OTHER (Specify)

## 14. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	BONANZA	Seed size	BONANZA
Leaf size	BONANZA	Coleoptile elongation	BONANZA
Leaf color	BONANZA	Seedling pigmentation	BONANZA
Leaf carriage	BONANZA		

REFERENCES: The following publications may be used as a reference aid for the standardization of character descriptions and terms used in this form:

1. Wiebe, G. A., and D. A. Reid, 1961, Classification of Barley Varieties Grown in the United States and Canada in 1958, Technical Bulletin No. 1224, U.S. Dept. of Agriculture.
2. Reid, D. A., and G. A. Wiebe, 1968, Barley: Origin, Botany, Culture, Winter Hardiness, Genetics, Utilization, Pests, Agriculture Handbook No. 338, U.S. Dept. of Agriculture. pp. 61 - 84.
3. Malting Barley Improvement Association, Milwaukee, Wisconsin, 1971, Barley Variety Dictionary.

COLOR: Nickerson's or any recognized color fan may be used to determine color of the described variety.

**EXHIBIT D****ADDITIONAL DESCRIPTION OF DUEL**

Duel is a six-rowed spring barley developed by Busch Agricultural Resources, Inc. It has excellent malting quality, but, is later in maturity than "Bonanza".

Duel has an intermediate juvenile growth habit. The spike is lax in density with an semi-nodding type head. Lemma awn is long and semi-smooth. Rachilla hairs are long. The rachis hairs are almost lacking. Glumes are one half the length of the lemma, with long hairs restricted to the middle. The glume awn is more than equal to glume length and semirough. The aluerone is blue and the hull is adhering and slightly wrinkled.

Duel is adapted to the spring barley producing areas of the prairie provinces of Canada; Alberta, Saskatchewan, and Manitoba.

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## **EXHIBIT E**

### **STATEMENT OF THE BASIS OF APPLICANT'S OWNERSHIP**

Busch Agricultural Resources, Inc. is the applicant for protection in this case being:

- a. The incorporated business registered in Delaware for and within which regular employees have bred Duel.
- b. The proprietary owner and intending commercial seller of Duel.

**EXHIBIT F****AGRONOMIC AND QUALITY DATA OF DUEL**

SIX-ROWED WESTERN CO-OP BARLEY TRIALS DATA.....	1-3
SOIL ZONES.....	1
AGRONOMIC DATA.....	1
DISEASE REACTIONS.....	2
QUALITY.....	3
B.A.R.I./PRAIRIE PROVINCES DATA.....	4-5
YIELD.....	4
AGRONOMIC.....	4
QUALITY.....	5

## CO-OP SOIL ZONES

<u>VARIETY</u>	<u>YIELD KG/HA</u>				<u>TOTAL</u>	<u>% BONANZA</u>
	<u>ZONE 1</u>	<u>ZONE 2</u>	<u>ZONE 3</u>	<u>ZONE 4</u>		
DUEL	49.7	52.5	55.7	41.7	50.7	109
BONANZA	45.8	49.3	47.4	39.3	46.4	100

ZONE 1 BRANDON, GLENLEA, MORDEN, PORTAGE-LA-PRAIRIE, MANITOBA  
MELFORT, INDIAN HEAD, N BATTLEFORD, SASKATCHEWAN

ZONE 2 SASKATOON, REGINA, SCOTT, SWIFT CURRENT, WATROUS, SASK.  
LETHBRIDGE, ALBERTA

ZONE 3 LACOMBE, TROCHU, CALMAR, VERMILION, EVANSBURG, OLDS,  
ALBERTA

ZONE 4 BEAVERLODGE, FT. VERMILION, ALBERTA

## CO-OP AGRONOMIC DATA

<u>VARIETY</u>	<u>HD</u> <u>DAYS</u>	<u>HT</u> <u>CM</u>	<u>LODG</u> <u>1-9</u>	<u>MAT</u> <u>DAYS</u>	<u>TKW</u> <u>GM</u>	<u>TWT</u> <u>KG/HL</u>
DUEL	57.7	87.3	3.1	93.2	37.9	59.1
BONANZA	55.3	91.0	2.9	91.5	36.4	59.9

## CO-OP DISEASE REACTIONS

<u>VARIETY</u>	<u>SMUT(% INFESTED PLANTS)</u>			<u>STEM RUST</u>	<u>NET BLOTCH</u>				<u>SCLD</u>	<u>% R.ROT</u>	
	<u>U.NUDA</u>	<u>U.HORDEII</u>	<u>U.NIGRA</u>		<u>SF</u>	<u>102</u>	<u>858</u>			<u>1</u>	<u>2</u>
DUEL	73	12	10	30MR	4	9	9	S		30	41
BONANZA	61	16	14	25MR	6	9	9	S		34	52

ROOT ROT: 1=SASKATOON LOCATION, 2=SCOTT LOCATION

NET BLOTCH: SF= SPOTTING FORM OF NET BLOTCH  
 102= RACE PRODUCING "NORMAL" NB SYMPTOMS & REACTIONS  
 858= "NORMAL" SYMPTOMS W/ DIFFERENT VIRULENT SPECTRUM

STEM RUST: MR = MODERATELY RESISTANT

## CO-OP QUALITY DATA

VARIETY	YR	% PLUMP	TKW	PRO	F. EXT	C. EXT	F/C DIF	SOL PRO	S/T	DP	AA
DUEL	84	69	34.0	13.0	76.5	73.5	3.0	5.5	43.6	236	53
	85	93	36.2	13.2	77.1	74.2	2.9	5.0	40.1	146	45
	86	91	37.7	12.3	77.0	73.5	3.5	4.6	38.6	126	52
	MEAN	84	36.0	12.8	76.9	73.7	3.1	5.0	40.8	169	50
BONANZA	84	71	33.6	13.1	76.3	74.3	2.0L	5.5	42.0	234	56
	85	94	35.0	14.2	76.4	73.6	2.8	5.4	40.6	152	44
	86	88	36.3	13.1	76.5	74.1	2.4	4.9	38.7	135	54
	MEAN	84	35.0	13.5	76.4	74.0	2.4	5.3	40.4	174	52



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**B.A.R.I./PRAIRIE PROVINCES YIELD**

<u>VARIETY</u>	<u>YIELD % BONANZA</u>							<u>MEAN</u>
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	
DUEL	111	104	127	109	118	116	98	112
BONANZA (BU/A)	100 (65)	100 (49)	100 (61)	100 (84)	100 (113)	100 (78)	100 (85)	100 (79)

**B.A.R.I./PRAIRIE PROVINCES AGRONOMIC**

<u>VARIETY</u>	<u>HEAD DAYS</u>	<u>HT CM</u>	<u>LOD 1-9</u>	<u>TKW GM</u>	<u>DIS 1-9</u>
DUEL	55	93	1.9	40	6.6
BONANZA	54	95	2.2	37	8.0

9000119

**B.A.R.I./PRAIRIE PROVINCES QUALITY**

<u>VARIETY</u>	<u>% PLUMP</u>	<u>PROTEIN</u>			<u>EXT.</u>	<u>DP</u>	<u>DP/ PRO</u>	<u>AA</u>
		<u>MALT</u>	<u>WORT</u>	<u>W/T</u>				
DUEL	86	11.6	3.8	33.1	78.7	120	10.4	38
BONANZA	82	12.5	4.0	31.7	77.6	137	11.0	37